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*Thos. R. Bacon*  
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# **The Scientific Study of Infant Intelligence**



**A LECTURE**

BY  
**HENRY T. BLAKE**

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# THE SCIENTIFIC STUDY OF INFANT INTELLIGENCE

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A LECTURE

BY

HENRY T. BLAKE

UNIVERSITY OF  
CALIFORNIA

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PRELUDE

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THE VERSATILE BABY.

*Dramatis Personæ.*

*Ma*, the baby's mother.

*Pa*, the baby's father.

*Baby*, the boy himself.

*Chorus*, sisters, cousins, aunts, grandma.

*Ma*—Come, Baby, show these people here  
How very smart you are.

Call Pa.

*Baby*—Ba ! ba ! Bopup.

*Chorus*—Precious heart,  
How very smart.

*Pa*—Now, darling, sing that pitty song,  
“Baa ! baa ! black sheep,” for pa.  
Baa ! baa !

*Baby*—Ba ! ba ! Bopup.

*Chorus*—Well, I declare.  
What genius rare !

*Ma*—And now, my precious little one,  
Say by by to papa.  
Ta-ta.

*Baby*—Ba ! ba ! Bopup.

*Chorus.*

O, wonderful ! magnificent ! his like was never seen ;  
A most precocious youth is this whose weeks are but eighteen.  
To say so much, and like to say, is all so very plain !  
His equal ne'er has been before, nor will be e'er again.  
Upon his natal day the Fates in union must have smiled,  
For nothing else could have produced so versatile a child.

[Curtain.]

(From Harper's Magazine.)

UNIVERSITY OF  
CONNECTICUT

## LECTURE

LADIES AND GENTLEMEN:

One of the most cheering indications connected with the scientific progress of the present day, is an awakening interest in the character and habits of various classes of our fellow beings who have hitherto been deemed worthy of little or no consideration. Influenced by this humane tendency, a number of European philosophers and savants, for a period of years extending back as far as 1856 and even earlier, have devoted profound attention to the growth of mind in infants, especially their own; and have given to an admiring world accounts and results of experiments and observations made in their respective nurseries. The important, nay, startling discoveries they made as to the hitherto unsuspected intelligence of European babies, at length attracted notice on this side of the ocean also, and Brother Jonathan's patriotic emulation was speedily aroused. At the annual meeting of The American Social Science Association in 1881 public attention was called by the Department of Education to the notorious apathy with which parents have been accustomed to view the intellectual achievements and mental development of their offspring. A most interesting and valuable report on the subject was made by the Department, which report with accompanying documents was published in January, 1882, for popular instruction and use. Its importance as the first step toward inaugurating a new era in human progress may be inferred from a statement made by the chairman of that department in his opening address: He actually declares that "the secretary has devised a plan by which to interest the mother in her child's growth";

[This Lecture was given in March, 1889, in "The Mechanics' Course" of the Sheffield Scientific School of Yale University, and some months later before "The Scientific Society of Bridgeport, Conn."—It is now printed by request of friends, some of whom have recently attained to parental or grand-parental dignity and who desire to have in permanent form all the light which science affords to guide them in their new responsibilities.]

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and he buoyantly adds that "one intelligent woman who is interested in this subject will kindle an interest which will spread throughout an entire *town*." The noble plan which is thus proposed to remedy that glaring evil of maternal indifference which has hitherto weighed like an incubus on the infant's progress, is happily most simple and effective. It is merely that parents shall hereafter daily and hourly register in a volume suitably prepared all of the baby's good and evil actions—its brilliant and stupid utterances and achievements, and its mental and physical outgoings and shortcomings. That the parent shall in fact open a set of books, and keep a running account with every baby produced, in which its intellectual debits and credits shall be carefully entered and posted, so that an exact balance of its mental and moral value may be ascertained at any given instant. "The importance (so reads the Report) of making some systematic effort to record the development of infant life has occupied the thoughts of many people in various countries for a long period. This Department has undertaken the difficult task of collecting statistics, and has issued circulars in the form of a register for such statistics." A copy of the register in blank form is appended to the paper and a number of parental reports based upon it which were received during the previous year are printed, revealing the mental development of various babies under the scientific rather than pet designations of "Case A," "Case B," etc., to which more particular reference will be made hereafter. A letter to the secretary is also published from Dr. Darwin expressing his interest in the proposed investigations into the mental and bodily development of infants. "Very little," he mournfully remarks, "is at present accurately known on this subject; and I believe that isolated observations will add but little to our knowledge; whereas tabulated results from a very large number of observations systematically made, would throw much light on the sequence and period of development of the several faculties." We heartily respond to these inspiring words of Dr. Darwin, and cordially recommend the free use of the registers. No family can afford to be without them, and it would even be well for those without infants to keep a liberal supply on hand for use in case of accident or unexpected emer-

gencies. Children cry for them ; and when these mental and moral inventories shall have been fully filled up, and duly verified under oath, we would earnestly advocate the tabulation of the infants also according to their respective merits ; and then would even go so far as to recommend—out of compliment to Dr. Darwin—the survival of the fittest !

The work thus laid out for parents in this country by the Social Science Association eight years ago does not appear to have since borne the fruit that might have been reasonably expected. Mothers and fathers, and even grandparents, have been backward in coming forward to obtain the registers. The “one intelligent woman” who was to feel an interest in the subject, and to “spread it through an entire town,” has yet to be discovered ; and it is partly in the hope that she may be found in this audience that I have consented to address you this evening. For it must be confessed that the principal hope of science for progress in this beneficent work rests on the female sex. A baby, as is well known, is in every well regulated family, so far as its father is concerned, a pitiable and neglected object. Its advent is welcomed by him with no generous enthusiasm. Its physical beauties are unobserved ; its mental precocities are ignored or depreciated ; and its vocal and linguistic performances, instead of exciting emotions of delight and pride, have too often only served to stimulate the paternal wrath and profanity. Even Dr. Franklin with all his breadth of intellect and sound practical sense despairingly exclaimed : “What is the use of a baby ?” and rather than try to solve such a hopeless problem preferred to expose himself to the imminent risk of being struck by lightning. Unfortunately Dr. Franklin’s aversion to this branch of scientific inquiry has been too widely shared by fathers who have been more favored than he with opportunities to pursue it. The average paterfamilias, when aroused from the ragged edge of an uneasy slumber by the howling of his infant cherub, rarely trims the lamp of science in a calm, philosophic mood, or willingly expends any midnight oil except that of castor or goose grease. Nor will he on such occasions, if he can help it, stand long in his airy garb coolly to investigate the true inwardness of the infant’s mental organism or to record impartially the

bottom facts of its physical phenomena. May we not hope, that when the registers shall have come into general use in the nursery, this reproach of paternal indifference and wasted opportunity will exist no longer? We may at least congratulate ourselves that science, which has achieved so great results in utilizing refuse like coal tar, street sweepings and sewerage, has now taken up the baby with almost equal prospects of successful results. And surely no more auspicious time could occur than now for that much needed intelligent woman to arise and paint the town red, when even our national administration installed in the White House submits to the paramount sway of Baby McKee.

As we have already seen, the art of recording the steps of mental progress in infants had not been entirely unknown even before the registers were invented in 1882. Among the more important publications which had appeared up to that time, containing carefully kept diaries of the vocal and mental accomplishments of different babies, were papers by the distinguished M. Hyppolite Taine, by Professor Darwin and by Frederick Pollock and others. Also a French work by M. Bernard Perez which was last year translated into English under the title of "The first three years of Childhood"—and a lecture on "Psychogenesis" by Professor Preyer of Jena, since developed into two good-sized volumes, English translations of which have been published very recently. It is worthy of notice that all these investigators, when they began to write on the subject, had just been blessed with their first-born offspring. By a curious coincidence they had also just awaked to the fact so strongly presented by the American Association Report, that the psychology of babies had not attracted a fair share of attention on the part of their parents, grandparents, sisters, cousins or aunts, and that the great need of the times is to do justice to their extraordinary intellectual merits. By a singular and most happy circumstance it also occurred, as is plain to the most casual reader, that the particular infants with which these authors were severally specially concerned were most favorable subjects of investigation, by reason of being among the brightest and best of infants which—up to that time—had ever been born. M. Taine, it is true, says in a depre-

cating way, that his "subject" was "a little girl whose mental development took the ordinary course, being neither precocious nor the reverse": but it is only too evident that in this cautious language he either underestimates or deliberately understates the brilliant qualities of his offspring—and it is hardly credible that so intelligent an observer as M. Taine could have been unconscious of the fact, however parental modesty may have struggled to conceal his convictions. The records of M. Perez concerning infant development are much more general. They relate with scientific impartiality the acts of numerous infant prodigies besides his own, and are especially full in celebrating those of a certain infant phenomenon whom he calls "Young Tiedemann," and who we learn "was the son of Tiedemann, a philosopher of the 18th century." The father of this young gentleman, it appears, kept a diary of the infant's doings a hundred years ago, and the first recorded indication of his genius is that "On the first day after his birth, he would when inspiring suck anything put into his mouth." A still stronger corroboration of his philosophic parentage appears in the fact (if it is a fact) that "at five days' old he appeared to laugh without any particular motive," but this statement staggers the credulity of M. Perez, as it makes him out, to use his own language, "altogether too remarkably precocious." Notwithstanding M. Perez's caution in accepting this and other stories of this infant's precocity, he narrates many about which he evidently has no doubt; fortunately he is careful always to refer to the hero of them as "*Young Tiedemann*," lest his readers might suspect that in a moment of forgetfulness he was relating some intellectual feat of "*Old Tiedemann*," though indeed some of them would be hardly credible even of a philosopher of the 18th century. Thus we are gravely assured and expected to believe that "*Young Tiedemann*," before he was 13 days' old, would "reject different medicines after having tasted them several times," and his philosophic progenitor is unable to account for so singular a proceeding except upon the theory that "he distinguished them from his food by their *smell*." At the age of four months this sense of smell had become so acute that when he saw anyone else taking a drink, "he would twist his mouth as

if he were himself tasting something." But the most remarkable proof of his discernment was given at the age of 13 months, when he collected a number of cabbage stalks and set them up in a group to represent his father and associate philosophers of the 18th century. Upon this achievement M. Perez exclaims with admiration that "the future savant" must have been "exceptionally gifted with precocious talents!" One more instance of the intellectual precocity of this wonderful youth must suffice. It is recorded that at the age of four months lacking three days "Young Tiedemann tried for amusement to make all sorts of movements and to take different postures." The importance of this circumstance, as Captain Cuttle would observe, "lies in the bearings of it." That Young Tiedemann had at an earlier age been accustomed "to make all sorts of movements and to take different postures" is more than likely: but it was at the exact age of four months lacking three days that he tried to do it for amusement. From the fact that he only *tried*, the inference is strong that his pleasantries were not appreciated and that he was promptly sat down on, at least in a figurative sense, by his more serious-minded guardians.

Though this performance of young Tiedemann breaks the record of infantile agility as an expression of amusement, yet similar demonstrations have been known at even an earlier age from other intellectual motives. M. Perez himself refers to a "little boy" whose name is not given but which it would have been agreeable to know (not necessarily for publication, but simply as a guaranty of good faith), who on the second day of his life when dressed "gesticulated in a manner painful to see and especially when his arms were put into the sleeves." Whether this preference for the absence of clothing was due to ambition on the part of the young man to take part in a boat race, or whether it arose from a general masculine indifference to the subject of dress is uncertain, but it is worth while to contrast it with the early development of feminine interest in the opposite direction. Thus we learn from Prof. Preyer that a little girl only 14 days old "gazed with surprise" at the fashionable hat of a lady who approached her. The statement has an air of probability, except that "surprise" seems rather a

mild word for the emotions which an intelligent child, at least of the present day, would naturally display at first sight of such an extraordinary object. Another little girl "3½ months old" could not only indicate where her feet were but also distinguished her *dress* which she seemed to take for a part of her person," and who furthermore showed "a strong passion for *color*." So early a chromatic infatuation is rare in the recorded cases, but Dr. Alcott assures us that it was surpassed in the case of his eldest daughter, who "on the 10th day after her birth, had her attention arrested by the contrasted colors of her mother's dress, and her attention was accompanied by a *smile*." We are not informed whether the smile was one of approval or derision, or whether it was one of those unmeaning, non-committal smiles which M. Perez declares "often occurs before the age of a month." He adds, "children of two months *laugh*, but without seeming to know that the laugh expresses anything." Dr. Darwin, however, repels this sweeping charge of idiotic cachinnation, and while admitting that his first infant did not truly smile till 45 days old, declares that at a little over three months he laughed with a keen appreciation of humor and suggestively adds, "we should remember how early puppies and kittens begin to play." The question how early infants begin to smile is a burning one among the various investigators, who differ widely in their conclusions. The truth is that the correctness of their observations is often open to doubt, since very many demonstrations which these eminent but inexperienced male philosophers took for *smiles*, would probably have been pronounced by any practical female nurse to be "nothing but wind." We are not so skeptical on this point, however, with reference to the smiling of Case E, reported in the Social Science pamphlet. This case was composed of two boys "both of whom," it is stated, "were born in Connecticut, together with their parents." Such a complex form of contemporaneous birth is very unusual in Connecticut, and infants with so happy an experience both as to the locality and the circumstances of their origin might be expected to show a special degree of cheerfulness. We are therefore not greatly staggered to learn that Case E, No. 1, at eight weeks "tries to smile," while Case E, No. 2, "at eight

weeks smiles beautifully." So confident is the happy mother of the correctness of her observations that she declares that she had "prepared a circular on the subject to forward to her *Vassar* friends"—but why to *them* is not very apparent. But notwithstanding a few exceptional cases, the melancholy fact seems clearly established that babies not born in Connecticut do not smile at a very early age. Indeed, MM. Perez and Taine declare, and other writers generally agree with them, that "agreeable sensations are not manifested before the age of two months." While we fear that this accords with the ordinary experience, we confess that we cannot, in looking through the records, discover any good reason why agreeable sensations *should* have been manifested by the infants reported on, considering the experiments to which they were subjected. Thus we learn that "passing the feather of a quill over the eyes and nose of a child 15 days old, made it frown." The nurse of Case C reports that she "could wash through his eyes, or throw water in them, without his closing them. Tapping him all around the eye within half an inch of it, he does not move till the taps reach the nose near the inner angle, when he *partially* winks." Shaking the fist in the infant's face, tickling the soles of his feet, "rattling pasteboard boxes containing comfits" close to its ear, sneezing suddenly and violently, and making unexpected hideous noises "resembling a loud snore," are all specified as excellent experiments to call forth the expression of agreeable sensations. The blank "registers" suggest a still better one by requesting information of the earliest age at which the child first notices the prick of a pin; to answer which inquiry of course requires an incessant prodding with that implement from the moment of its birth. Possibly this last test or something similar not yet devised may be successful in proving the infant susceptible to emotions of pleasure, but for the present it seems to be agreed that even with every encouragement of this kind he don't fully know how to enjoy himself.

A partial compensation for this unhappy condition is sought for by some philosophers in the theory that as a general rule babies suffer little discomfort from things that are disagreeable. As a remarkable illustration of this tempering of the wind to

the shorn lamb, it has been asserted that infants are nearly or quite insensible to bad smells: which, if true, is a very fortunate circumstance for the baby. Whether this insensibility ever exists or not, and if so, when it disappears has been a subject of some discussion. M. Perez, who was a very careful observer, seems to incline to the total insensibility view, while most other writers agree that babies make odorous comparisons even at a very early age. The most interesting experiments on this point are those made by a German savant, an indefatigable, merciless tester of baby sensibilities of all sorts, bearing the amiable name of Kussmauler, of whom more will be said hereafter. This ingenious person smeared infants with asafetida, petroleum, Dippel's oil and other pungent and odorous liquids, and by this means conclusively proved that a baby's smelling instinct may be developed cent per cent. Professor Preyer tried more agreeable perfumes upon his child with much more limited success. "In the 15th month freshly ground coffee and cologne water held under his nose made no impression at all till the end of the month, by which time the cologne water "made him laugh." It was not, he says, till the end of 18 months that "genuine snuffing," by which he means smelling in a really scientific way, was manifested. It is possible, however, that Professor Preyer's child was peculiarly unsusceptible to the sensation of smell on account of what he calls "the surprising immobility of its nose."—"which rarely moved," he says, "before the end of the 7th month." What particular acrobatic feats the professor expected the infant's nose to perform before the 7th month it is hard to say, but by the end of that time it seems to have become more agile or more appreciative, for the professor records that it would then "*turn up*" significantly at his approach. From this fact it would appear that there are cases in which a wise child nose its own father, and also has a decided opinion about him.

It would seem from this significant gesture of Professor Preyer's infant that even a baby's tolerance of disagreeable things can have a limit. Indeed, there are other indications on record to the same effect. M. Perez speaks of a child 11 months old which showed a marked aversion for "a little barking black dog, also for *the rod* that he was whipped with [at



11 months] and a syringe.” As an illustration of the sympathy which infants feel for others, he tells us of a French child 16 months old who burst into tears on seeing his father take a shower bath. The cause in this case might seem inadequate to the effect but for the explanation by M. Perez that the old gentleman was washing himself by advice of a physician, so that the sight must have been to the child quite rare and unexplainable. Possibly the operation effected such a complete change in the patient’s appearance that he became unrecognizable, or the parent may have vigorously manifested his own discomfort in the unaccustomed ablutionary experience. At all events he declared to M. Perez that he was finally “obliged to put the child out of the room away from the painful sight,” and added, “this sympathetic sensibility touched me deeply.” The infant’s agitation was certainly not owing to a native gentleness or tenderness of spirit, for M. Perez asserts that this same child displayed toward *cats* the most unfeeling disposition. He admits that children in general regard cats as beings having no rights which they are bound to respect, nevertheless he considers the interest of children in animals one of their most conspicuous traits. “Dogs, cats, sheep, birds, chickens,” he says, “are all par excellence their objects of recreation, instruction and affection.” As an illustration of this affectionate interest he cites the case of a child six months old, which, being left alone with a turtle, half tore off one of its feet, and when the nurse arrived was pulling off another. This statement certainly raises a strong presumption of affection for the turtle on the part of the baby, but there is still room for doubt as to its conclusiveness. The reptile employed in the experiment was probably the common land turtle, which is of a dull, unsympathetic nature, not likely to call out the child’s emotional feelings. It is therefore uncertain whether the vivisection proceedings referred to were in a loving or scientific spirit. In the interest of science it is to be hoped that some infant whose affectionate disposition is in doubt, may be supplied with a snapping turtle more likely to reciprocate its gentle attentions. Is there not in this audience some bachelor uncle or nervous inmate of a boarding house who to settle the question in some such case would be willing to furnish a turtle, provided he or she may also be allowed to select the baby?

The reference we have already made to the valuable investigations of Kussmauler into the progress of infant development suggests the propriety of referring with more particularity to the important discoveries made by himself, Professor Genzmer, Professor Preyer and other German philanthropists with respect to baby sensibilities and endurance.

The assiduous course of study and experiment pursued by these energetic investigators ranks them as friends of the infant race hardly surpassed by the good King Herod. Fortunately for science, two of them, at least, Kussmauler and Genzmer, had peculiar facilities for pursuing their philanthropic inquiries, being practitioners in a foundling hospital. Here they not only found an abundance of raw material, but had no fear of hindrance by that usual bane of scientific progress—an unscientific and excitable mother or nurse within reach of their hair. Under these happy conditions it is safe to say that the scientific study of infant intelligence did not fall into innocuous desuetude; and few asylums ever contained a greater number of spoiled children than that in which these industrious psychologists, “with ghoulish glee,” worked the babies under their charge for all they were worth in developing their infant faculties.

Without going too much into the details of each experiment, it will be interesting and instructive to specify a few of them briefly with their results, as a guide and encouragement to future observers. One object was to test the development of the infant’s physical senses, and the experiments were naturally directed to the different organs by which the several senses are exercised. Thus to ascertain the state of the infant’s eyesight, Professor Preyer continued for several months assiduously to brandish his hands and jerk his head threateningly toward his child’s face, and was rewarded by finding that by these persuasions the child could in 60 days be induced to wink, and after 14 weeks became so frightened that it would throw up both its arms. To produce winking, it has been ascertained that thrusting the finger *close to* the baby’s eye is much less effective than the whole hand: but poking the finger *into* the eye, or against the lid, never fails; while suddenly blowing into the face with a tube will, he assures us, make it wink with uncom-

mon quickness. At the end of the 30th week a fine result in the way of winking may also be produced by rapidly opening and closing a green fan at 18 inches from the face. A beautiful squint may be obtained as late as the 20th month by placing the end of the finger at the tip of the baby's nose; and Professor Preyer seems to have adopted this plan to correct a singular habit which his infant had contracted of gazing at its own forehead. Professor Preyer also discovered that if, during the first two days of the infant's existence, a lighted candle is repeatedly flourished close to its eyes it will be brought "into a general state of discomfort," and if "a very sensitive infant, will be made to cry." Whether the Preyer baby was a sensitive infant or not does not appear, but this interesting experiment on its eyesight seems to have been kept up till the 15th month, when either partially blinded at last, or exasperated beyond further endurance, it "grasped the flame of the candle with its hands." This incident appears to have greatly amused the professor, and elicits the jocosely remark that the child "will never do it again."

Not less instructive are the researches made by the different investigators into the baby's sense of *hearing*. The question whether new-born infants can hear or not has been in dispute. Some appear to hear more readily than others. The best method of testing the child's capacity in any given case is said to be shouting, whistling and clapping the hands in its ears for the first four weeks. At the end of that period if it does not respond it will be known to be deaf and dumb: but whether born so or made so by the experiment will always be doubtful. Kussmauler made loud, discordant noises near the ears of new-born children while they were awake without disturbing them much, but Feldsbauch got better results by clapping his hands violently over them while they were asleep. Champney's child, however, when sleeping did not succumb to this test, and he was forced to resort to a hard slamming of the door so as to shake the bed. Genzmer hammered a bell with an iron rod for 24 days at different distances from the ear, ranging from one inch to 20 inches, in order to set the eyelids to quivering, and generally succeeded: his toughest subject he says was "a very phlegmatic child" who held out pretty well till the 8th

day, when he gave symptoms of objecting to the rattling at five inches from his ear. The results, after trying this on 15 children, were found to be very uncertain. Dr. Moldenhaur adopted what Professor Preyer calls "a much better mode of proceeding." He made use of a French toy called "*the cri-cri*," which gives a loud, brief, disagreeable sound with discordant high overtones," and held it "quite close to the ear" with great success, as the child invariably jumped at the first trial. Fifty children were tested, of whom ten were less than 12 hours old. The results were highly satisfactory. Eyelids quivered, foreheads wrinkled, "then came head movements, mostly single, short twistings of the head; finally starting, accompanied by violent quivering of the head, the arms, and the upper part of the body. Sleeping children awoke and screamed." The same inventive genius, Dr. Moldenhaur, conceived the original idea of awakening the child's musical taste by applying a tuning fork in strong vibration against its head as a sounding board; but as Professor Preyer discouragingly records, he got no definite results, "owing to the sensitiveness of the skin." Dr. Deneke, not discouraged by this failure, procured a pair of cymbals and banged them together close to the ear of an infant six hours old, at which demonstration the baby very sensibly "shut his eyes tighter every time." Professor Preyer in the 21st week of his child beat a gong before it in order to give it a tranquil expression while sitting for its photograph. He reports as the result that the child "was transfixed with astonishment"; a rigidity the more remarkable when we consider the extraordinary flexibility of its organism, for he solemnly assures us that by putting coal into the stove behind the same child it could be made to turn its head around nearly 180 degrees. A little girl nine months old who, it is declared, "sang beautifully to the piano," was treated to a tin horn accompaniment until she "wept bitterly." And Professor Preyer, on the 25th day after his child was born, proudly records that he startled it into convulsive fright by standing before it and suddenly shouting "JAH!"

With respect to the infantile sense of *taste*, the recorded experiments are not so numerous, but they evince the same commendable thoroughness and ingenuity. This branch of

inquiry has also some connection with that relating to *smell*, which we have already remarked upon. In order to cultivate in infants a correct judgment in matters of pure taste, Kussmauler and Genzmer stuffed into the mouths of more than 40 newly-born children different substances successively, including salt, quinine, tartaric acid and sugar, and discovered that they all made "grimaces" at everything except the sugar. By close observation it was ascertained that the character of these "grimaces" differed in correspondence with the dose. There was a "bitter grimace" and a "sour grimace" and incipient *saltatory* movements when the drugs were administered, while the sugar, after the child discovered that it *was* sugar, produced a "sweet expression." Some other experiments, including Genzmer's rubbing of petroleum and asafœtida on the baby's lips, are properly discarded by Professor Preyer as inconclusive, since they involved the sense of smell; and he correctly suggests that the proper method in such cases is to bandage the child's eyes and tightly hold its nose when the drug is introduced; since under those circumstances the expression of its countenance, whether pleased or otherwise, will be solely due to the taste of the medicine.

The experiments on the infant's sense of *touch* or feeling have been much more varied and lively, but we can only refer to a few of them. Professor Preyer is authority for the singular fact that new-born children can be made to scream by pinching and spanking. Tickling of the nose produces sneezing and winking, and if persistently kept up, "movements of the head and the hands, and even *tears*," a remarkable precocity, since children, he says, "*generally* shed no tears on the first days of life"; but he forgets that most children are not so fortunate as to have a scientific parentage. Kussmauler and Genzmer poked fingers into babies' eyes, and blew into their faces and found that the baby ordinarily closed the eye poked or blown upon. Following up this curious discovery, it has been found that tickling the nose on the tip makes the baby shut both eyes. Tickling one side makes it shut the eye on that side. Tickling and slapping the sole of its foot makes it wiggle the leg; and sometimes both legs. Pricking with needles, if thoroughly done, is apt to make it restless "after

two seconds, but a sound slapping is better because then it is explained "the force of the stimulus is exerted on a greater number of nerve extremities." A very valuable discovery made by Professor Preyer is that a screaming baby can be instantly quieted by thrusting a finger deeply into its ear. This expedient answers, however, only for the first six months; after that it fails. Another strange fact stated by Professor Preyer is that if a new-born child is slapped it cries out "without knowing *where* it was slapped, nor (what is more probable) the *cause* of the blow;" and he adds that "it is not till the blows fall *frequently* on different parts of the body that distinctions of space come gradually into the child's mind *as well as* sensations of pain." Genzmer stuck glass rods down babies' throats to see if they would choke, and they did; he applied an ice-cold iron rod to different parts of their bodies to make them lively, and it did; but although he pricked their feet, noses, upper lips and hands until the blood came, Professor Preyer declares that they did not respond "till after two days." He suggestively adds that if "fifty needle pricks had been applied simultaneously" there might have been a quicker response, and Kroner found in 1882 that new-born babes could be set to screaming and distorting their faces by giving them a strong electric shock. After this no doubt remains that infants have *feelings*, whatever may be said of the philosophers; and we are not surprised to learn that Kussmauler alone has noticed in young infants symptoms of nausea, or that Genzmer dissents from Dr. Darwin's dictum that babies do not shed tears before they are two months old.

Before leaving this part of our subject we must refer to those most interesting phenomena of infant life, the *reflex movements*; so called because they are made without reflection. These curious movements were first discovered by Taine in 1870, and his observations have since been confirmed by later writers. Taine thus described them as they were exhibited in his own first-born progeny. "From the first, probably by reflex action, this child cried incessantly, kicked, moved all its limbs and perhaps all its muscles." Darwin noticed the same peculiarities in his own first baby. "During the first seven days," he says, "various reflex actions, namely

sneezing, yawning, stretching, and of *course* sucking and screaming, were well performed by the infant." And M Perez asserts that infants in general make "vague incoherent movements with their arms and legs, striking right and left without any definite object." M. Taine informs us that he succeeded in obtaining an excellent display of these movements by laying his "subject on her face on a carpet in the garden," and that in this luxurious position "*she for hours at a time* would work with all her limbs, uttering a multitude of different cries and exclamations consisting exclusively of vowel sounds." "This went on," he says, "for several months." Darwin improved on this experiment by tickling the sole of the infant's foot, which thereupon, he says, "performed a jerking movement accompanied by a curling of the toes"; but Preyer was unable to achieve a similar success although he industriously inserted pins into various parts of the infant's person. It would appear however that this infant of Preyer's was a somewhat unfavorable subject for the experiment, as he had a habit of biting his own arms, fingers and tongue, pounding hard objects against his teeth and beating his own head with his fists. The Professor remarks that the child, while thus thumping its own head, "seemed astonished at its hardness." This suggestion throws a ray of light upon its failure to respond to the stimulus of the pins, for it shows that its actions were not reflex but reflective; and it is probable that the pin experiment when carefully tried on a less contemplative infant will be a complete success. Much remains to be learned as to the cause and purposes of these mysterious movements, but the following lucid explanation by a writer in "*Mind*" of certain complex movements of his own infant and its reasons therefor, if correct, will go far to exonerate the race of infants from the charge of M. Perez that they move their arms and legs without any definite object. The writer says "the purpose of the flexion of the thighs on the belly was probably partly to relieve the tension of the suddenly contracted abdominal muscles; but the movement of the arms (and partly those of the legs also) probably had for their cause the necessity for relief by a '*nervous discharge of great amplitude*,' otherwise called a sneeze." To clear up this sub-

ject entirely, however, farther experiments seem to be necessary.

We are glad to see that all the students in this infant school of physiology appreciate the importance of investigating the influence of hereditary qualities on their offspring. By this means it may be hoped the talents and virtues of the parents as well as the children will be spread upon the record, and this will furnish a powerful incentive to make the registers full and truthful. Dr. Darwin, whom we should naturally expect to take notice of remote ancestral traits, remarks with a pardonable complacency that the vocal performances of his infant resembled those of the anthropoid apes. Professor Preyer also is struck with a close similarity of his baby to the same species of the Simian tribe, and thus establishes a near relationship between his own family and that of Dr. Darwin. Numerous other points of close resemblance between babies and monkeys, such as wrinkling the forehead, grasping the feet with the hands, shutting both eyes when sneezing, mimicry, etc. are declared by these observers to be *common to all infants*. But upon this delicate and dangerous point I venture no opinion. I content myself with imitating the prudent example of some of our Biblical critics, who merely state all the theories without committing themselves to *any*. Doubtless all intelligent mothers and grandfathers will be on the alert to discover and report new facts that may throw light on the question. However this may be, the view is held by all the authorities that the very young baby is an embodied reproduction of the barbaric ages of the human race. A late American writer declares that every life is a mere recapitulation of "man's ancestral progress upwards from his primitive savage condition," and that "the sooner all parents recognise the fact that their infants are in truth born savages, the better it will be for those infants." By close observation of the baby, therefore, as materialized history, many new facts have been ascertained respecting the habits of primeval man. Thus Professor Preyer informs us that the starting of babies a few days old at a sudden sound, is a relic of the frights of their barbarian ancestors. The custom generally observed by new-born babies of lying on their backs, and at a later period of creeping or rolling as a means of locomotion, is, it appears, an exact repro-



duction of similar practices on the part of pre-historic men before they invented the less convenient and agreeable habits of standing and walking. These latter accomplishments in fact, it is now found, are not natural to human beings, for as Professor Preyer declares, "it is merely the advantage which the upright position affords in the universal competition of living beings with each other, which long ago made that position habitual and hereditary." An English youth four days old, named Clifford, "grasped his father's forefinger and made an abortive effort to carry it to his mouth," and thus afforded incontestable proof of the "survival of a deeply-organized cannibal instinct." From the circumstance that in this youth "crying of the really miserable sort took place before smiling or even cooing," the same reflective parent deduces the discovery that "in the history of the human race the need of making known pains and wants was the more urgent and so was the first one to be satisfied."

At the end of the eighth week young Clifford "showed his first traceable germs of sympathy" by cooing when coaxed, but these sympathetic expressions soon gave way to "scolding noises"; very fortunately for the cause of chronological science, since thus was revealed the "period in human history when men began to exercise power and coercion over one another." The same historical authority, Clifford, Jr., by gazing at the face of a clock, and at the flickering of a fire-flame, disclosed "the primitive feeling respecting the second selves, or the ghosts of things," and by "shrieking at an ugly doll, and kicking at the sight of strangers," made known "the countless experiences of peril which the race endured when in its pre-social Ishmaelitic condition." Not to be outdone in prehistoric discovery, Dr. Darwin's boy ran away at sight of an elephant in the Zoological gardens, and thus proved to a demonstration that elephants formerly lived in Great Britain and terrified the monkeys.

It must be confessed in connection with this subject of heredity, that while the writers on infant psychology have shown so deep an interest in tracing back the ancestral traits of their offspring to the days of primeval man, they seem to be generally somewhat reserved about making deductions connected with the mental and moral qualities of the babies'

more immediate parentage. This is the more remarkable since with respect to physical characteristics they show by no means the same reticence. Indeed some of them incline to the view that even a high respect on the part of the parent toward some distinguished individual, without any relationship, may cause the infant to exhibit in a singular degree some personal peculiarity of such individual. Thus a college professor in Massachusetts writes with great pride that his baby bears an astonishing resemblance to Agassiz with respect to *baldness* and hopes that the likeness may ever continue. But it is with mental qualities that we are now concerned, and with regard to these it seems to be unanimously agreed by all the authorities that all those which are disagreeable or disreputable are derived from remote barbarian ancestors; it necessarily follows therefore that the opposite traits are inherited from the *nearest* progenitors; and this may account for the very modest and limited reference made by the different writers to their infants' virtues.

This brings us to an important and most interesting part of our subject; that which relates to the moral development of infants; but it is not desirable, if it were possible, to dwell long on this branch of inquiry. Since the doctrines of total depravity and original sin were given up, it has been generally agreed that infants have come directly from Heaven and as cherubs without wings afford the nearest representation possible of the celestial inhabitants. The recorded observations throw a strong light on this attractive theory and clearly show that the moral sentiments of infants are as numerous and as lively as—as snakes in Ireland. The lamentable conclusion of all the authorities is that the less said on the subject the better for the feeling of all parties especially in view of the doctrine of heredity. As one writer expresses it, "From two to four years of age children are transparent egotists, very self conscious and almost destitute of moral sense. Their parents are their moral law"; and then follows the natural inference, "Even at five years of age their standard of morality is not high and is liable to frequent and serious relapses."

After so candid a preface we are not much surprised to find this same writer summing up the entire character of his own baby at the age of twelve to fifteen months in the following

*frames of mind.*" This we think is asking too much. The Doctor's family pride carries him too far. It cannot be expected that mothers in general will feel so much interest in the Darwinian family tree, that they will provide phonographs and tuning forks as essential parts of nursery furniture, and then keep nagging their babies into "different frames of mind," in order to ascertain the keys on which Dr. Darwin's hylobate forefathers pitched their screeches. We are glad to see therefore that this request is wholly ignored in the registers.

From the dry and abstract review thus given of the achievements already accomplished by science in this new branch of human development, the imagination can easily soar onward and upward to its future triumphs. When the coming intelligent woman shall have properly fired the parental heart in every town, the fifth great act in the drama of human progress will have opened. The registers will go like *la grippe* into every house. Mothers, sisters, aunts, grandfathers of course, possibly even fathers, will engage in the scientific study of infant intelligence, and the merits of the newly-born generations will be rolled into the fold of a permanent record with as much precision and certainty as we used to operate last year's puzzle of "The little pigs in clover." Every properly constituted University and every Scientific Association will have its cradle of science and its baby chair of philosophy. Under the stimulus of registration also, a vast improvement may be hoped for in the quality of the registered article. In short, it is not too much to predict that when registration shall have produced its full effects, the millenium itself will have begun, and its prophetic scenes will be realized. For when the wise baby no longer fills his belly with the east wind, but is stuffed with facts, principles, and logical deductions; in short when the child is born a hundred years old, then the judicious lion looking for a breakfast will undoubtedly prefer to lie down with a lamb, or even to eat straw like an ox! Then, the infant, tough, leathery and juiceless, will repel the appetite of even the reptile tribes; so that then the sucking child shall be able to play safely on the hole of the asp and the weaned child to lay his hand without danger on the cockatrice's den.

## APPENDIX—MARCH, 1902

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It is gratifying to record that since the foregoing lecture was delivered, the sought-for Intelligent Woman has come to the front, not as a single individual but as an army with banners and infantry, to maintain the just rights of babyhood, and has kindled an interest not merely throughout an entire town, but through whole continents, and even among the distant Isles of the Orient. A leading scientific journal informs us (June, 1900) that "Child-study has recently become a most active department of psychology. It is the serious pursuit of men of science and the fad of women's clubs. A late accession to the magazines devoted to it comes from Japan." And we are proud to know from another journal that "In America more has been done to study the child than in all the rest of the world, and the work has as yet only begun."

It is pleasing also to note that the study has begun to advance from the mere observation of phenomena to that of training the infant's faculties for future use. Some of the recorded experiments in this direction seem worthy to be mentioned. A scientist in Washington, D. C., we are informed, "commenced the training of his child two years before it was born." This remarkable achievement was accomplished by the use of guinea pigs as proxies for the prospective child to determine in advance its probable mental and moral endowments and its physical capacities of endurance. These having been satisfactorily ascertained and the baby born, the infant soon after its birth was daily plunged into tubs of water of different temperatures in order "to store his brain with memories of all the degrees of heat and cold which any one is likely to encounter in the course of his life." Disks of various colors were frequently whirled before its eyes by an electrical machine "as the best possible foundation for an artistic education." Whistles of different pitches were sounded in the ears to develop its musical taste. Fifteen hundred phials containing as many different smells were successively applied at regular intervals to its nose "to build up the necessary smell memories and to teach him great acuteness in discriminating odor from odor." By a similar method its sense of taste was cultivated by poking straws into its mouth "which had been previously dipped in various substances." So successful has been this training that we are told "the child at sixteen months old can distinguish about fifty different tastes and thirty different smells," but by what indications it individualized each of these tastes and smells we are unfortunately not informed.

We are not surprised to hear that this child at sixteen months old "had a head unusually developed for an infant of its size," and might

have fears that its intellect was being trained disproportionately to its body ; but we are happily relieved upon this point by learning that abundant physical exercise was provided, albeit of a rather constrained and involuntary sort. To be more specific we quote verbatim : " That all of the brain cells governing his muscular sense will be fully developed this baby must have every one of the many muscles of his tender body moved systematically and at regular intervals. During this exercise the father keeps before him a manikin showing the position and direction of each muscle. At first the infantile limbs, head and body were moved in different directions by the father's hands until the memories of the muscular feelings were mentally enregistered." " No single muscle in the child's entire muscular system is neglected by this action contrived to combine mental memories of motion, speed and direction in his brain."

We are further informed and can easily believe that " all of this odd training is as thoroughly enjoyed by the infant as the ordinary romps of children." It must indeed be an unreasonable baby which would not rejoice to identify each muscle as it is pulled, wrenched or twisted with its representative in the manikin before him, and to mentally enregister its position and direction. For to use the words of an eminent professor of psychology in a recent work, " How can the sensitive soul of the child fail to be allured into an improvement of the opportunity to grasp the simple but important fact that A A, A, A, etc., although successive in time are similar states of consciousness as respects the content of sensation, the tone of feeling evoked, and the motor activities engaged?"

It is impossible in this brief note to refer to all the valuable contributions which American workers have made to the science of child-study, but it would be unpardonable not to mention some of their labors in the department of moral training. Among the more interesting of these are the investigations made by a western professor into the most convenient and effectual methods of child-punishment. This inquirer has issued blank registers in which parents may record all the offenses which their children commit, the kind of punishment administered in each case and the effect thereof. By this means it will be possible, after a great body of statistics have been collected, to determine the comparative advantages of the following and other forms of retribution, viz: Spanking, slapping, ear cuffing, birching, strapping, closet incarceration, banishment to bed, &c., &c. Lest the child should fail normally to afford sufficient opportunity for experiments in all these methods, the professor suggests the expedient of nagging it by arbitrary, unreasonable and senseless commands which may incite it to rebellion. In order to promote respect for parental authority, he recommends that fictitious stories of gross injustice by parents toward their children be related to the child with the request for its opinion on the case. In California this idea has been somewhat varied and amplified with interesting results. By prearrangement several hundreds of teachers read to their school children a story how Jennie painted the parlor chairs with her new box of paints in order to make them look pretty and to please mama. The question was then submitted, " If you had been her

mother what would you have said or done to Jennie?" Three thousand answers, we are told, were written out by boys and girls ranging from six to eleven years of age. Of the six-year-olds 1,536 girls and 1,770 boys voted that Jennie should be whipped. Of the eleven-year-olds 855 girls and 1,484 boys voted the same way, though the majority thought justice would be satisfied if Jennie should be sent to bed, or lose her paints. Of the rest of the children 228 thought it would be sufficient to make Jennie promise not to do so again. The great value of this effort to obtain infant views in ethics and penology is somewhat impaired by the fact that while only 3,000 answers were sent in, the votes as above classified amount to 5,828. So that we are left in doubt what the verdict actually was and in gloomy uncertainty what ought to be done in the not unlikely case that numerous susceptible children, inspired by the celebrity that Jennie obtained, will imitate her artistic achievement.

Without pursuing the subject further, enough has been said to show that 20th century babies will enter on life with more brilliant prospects than their predecessors for distinguished careers. And it may be further assumed that if many of them do not ultimately occupy places in various public institutions, including sanitariums, insane asylums and penitentiaries, it will not be the fault of the early training they will have received at the hands of enthusiastic votaries of child-study according to methods recommended by experts in that noble branch of humanitarian philosophy.

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